INTRODUCTION

A number of years ago, the Motor Vehicle Inspection Division and the Statistical Analysis Center of the Missouri State Highway Patrol conducted a study to determine if periodic motor vehicle safety inspection programs, specifically the Missouri program, had an impact on reducing vehicle defect causation factors in traffic crashes. This study has been updated using the latest three year's fatal traffic crash data available, 2000 through 2002. The results are described below.

Missouri, seventeen other states, and the District of Columbia have periodic motor vehicle inspection programs (States are identified in Appendix A). Most types of motorized vehicles registered in these states and the District of Columbia are required to be inspected for mechanical defects on a periodic basis, usually annually. The inspections are designed to uncover mechanical defects which, if left uncorrected, could cause or contribute to the cause of a traffic crash. Mechanical features normally covered in an inspection include:

- Tires
- Brakes
- Steering System
- Suspension System
- Exhaust System
- Headlights
- Signal Lights
- Horn
- Mirrors
- Wipers
- Wheels

Most of the 32 states not having periodic motor vehicle inspection programs do have some sort of limited vehicle inspection program. These states' inspection programs vary in scope and nature. In some cases, they are directed at only certain classes of vehicles (i.e., school buses, commercial motor vehicles, vehicles where there is a change in ownership, etc.). In other cases, they involve conducting random roadway inspections on most classes of motor vehicles where a relatively small segment of the total motor vehicle population is selected for inspection on an annual basis.

The results described in the remainder of this report should assist those who wish to assess this Program's worth. In addition, the Missouri State Highway Patrol conducted a Public Opinion Survey of a representative sample of Missouri citizens in 1997 (1,158 respondents). The respondents were asked to assess Missouri's current Motor Vehicle Safety Inspection Program. Close to two-thirds (62.0%) of the respondents favored continuation of the program. Another 5.5% had no opinion on the subject and less than one-third (32.5%) opposed its continuation.

METHODOLOGY AND LIMITATIONS

The intent of this study is to determine whether periodic motor vehicle safety programs have an impact on reducing vehicle defects as a causation factor in the worst types of traffic crashes, specifically those resulting in the death of one or more persons. An analysis was performed in which fatal traffic crash vehicle defect rates / ratios of vehicles registered in states having periodic motor vehicle inspection programs were compared to fatal traffic crash vehicle defect rates / ratios of vehicles registered in other regions of the nation.

Data used in this analysis were obtained from the National Highway Traffic Safety Administration (NHTSA), Fatal Accident Reporting System (FARS). This information system captures data on all fatal traffic crashes occurring throughout the country. These data are reported in a uniform manner to a federal repository in Washington, D.C.

For this study, vehicles involved in 2000-2002 fatal traffic crashes were included. In addition, to obtain a better perspective of the impact periodic vehicle safety inspections have on fatal traffic crashes, only certain classes of vehicles and certain types of vehicle defects were analyzed. The types of vehicles selected were automobiles, sport utility vehicles, motorcycles, vans, and light trucks (GVW 10,000 LBS and under). Other classes of vehicles, such as heavier trucks and buses, were excluded because a number of states not having periodic motor vehicle safety inspection programs do have limited safety inspection programs focusing specifically on these classes or sub-classes of motor vehicles. Also, the federal government has a vehicle safety inspection program covering interstate commercial vehicles (heavier commercial trucks and buses) which could affect the fatal traffic crash vehicle defect rates / ratios.

Those vehicles included in this study account for the largest number of vehicles involved in fatal traffic crashes. There were 173,308 vehicles in fatal traffic crashes during the 2000-2002 time period. Of these, 153,850 or 88.8% were automobiles, motorcycles, vans, light trucks, and sport utility vehicles.

This analysis included only those vehicle defects normally covered by periodic motor vehicle inspections that were potential traffic crash causative factors. Vehicle defects included were tires, brakes, steering system, suspension system, exhaust system, headlights, signal lights, horn, mirrors, wipers, and wheels. Those vehicle defects not meeting this criteria were excluded. For instance, a crash caused by a transmission that popped out of gear resulting in the death of a person would not be included in the study since transmissions are not normally inspected for defects.

A number of research limitations and issues are discussed below to assist in interpreting the study's findings.

1. This analysis was limited to an examination of vehicles involved in traffic crashes resulting in the death of one or more persons. The types of vehicles and their vehicle defect causation rates / ratios found in fatal traffic crashes may not be the same as those found in less severe personal injury and property damage traffic crashes.

2. Identification of mechanical failures as causation factors in vehicles involved in fatal traffic crashes is likely to be significantly under-represented based on the data source. The FARS system relies primarily on the field traffic accident report form produced by the investigating agency to identify vehicle defect causation factors. No additional vehicle investigation procedures are performed by state FARS analysts to identify mechanical failures. Most law enforcement officials charged with accident investigation and reporting do not have the time, training, or technical equipment necessary to fully evaluate most crashes from a mechanical failure perspective. Unless the mechanical failure or defect is readily apparent or obvious, it may go unreported.

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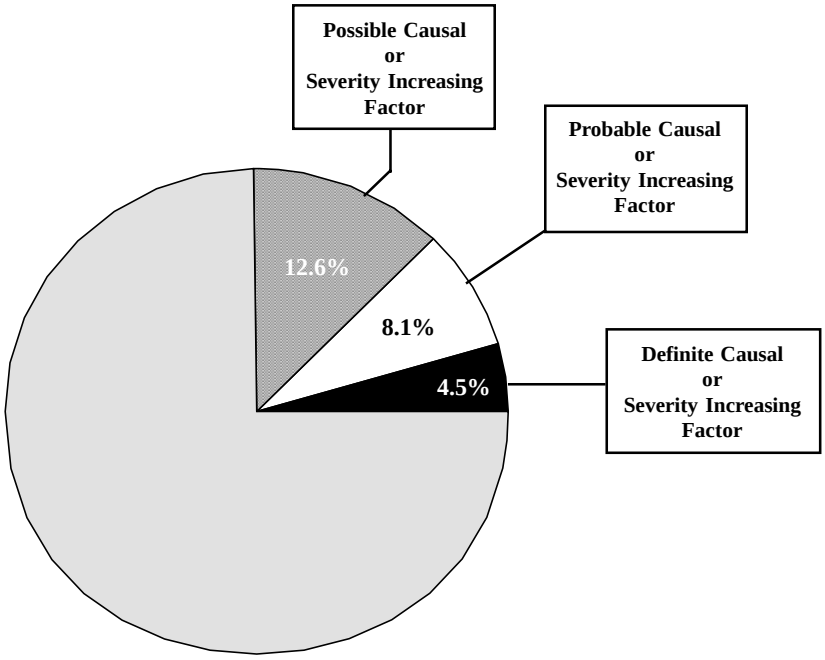
VEHICULAR FACTOR ANALYSIS



Note: In total, 25.2% of the 420 traffic crashes studied had a definite, probable, or possible vehicle defect that contributed to the cause of the crash or increased its severity.

FIGURE 1

A study was conducted by the Institute for Research in Public Safety, Indiana University to determine how frequently various human, environmental, and vehicular factors were involved in traffic crashes. A total of 420 traffic crashes were studied indepth by a multidisciplinary team. It was found that vehicle defects were a definite causal or severity-increasing factor in 4.5% of the crashes, a probable causal factor in 8.1% of the incidents, and a possible causal factor in an additional 12.6% of the cases.

3. Traffic accident investigation procedures and reporting standards of law enforcement agencies vary between and even within states. As a result, one cannot discount the possibility that differences in fatal traffic crash vehicle defect causation rates / ratios between states having periodic safety inspection programs and those that do not could, in part, be due to differences in traffic accident investigation procedures and reporting standards.

   In Missouri, all law enforcement agencies use a standard traffic accident report form and are required to report all fatal, personal injury, and property damage traffic crashes over $500.00. The Missouri FARS analysts receive copies of these reports if a fatality is involved. The Missouri traffic accident report form has a predefined field to identify vehicle defects as a contributing circumstance in the traffic crash.

FINDINGS

Table 1 identifies the total number of 2000-2002 fatal traffic crashes and fatalities occurring in the nation. In addition, the number of fatal traffic crashes and fatalities involving one or more automobiles, sport utility vehicles, motorcycles, vans, and light trucks which had vehicle defect causation factors is displayed.

TABLE 1

NATIONWIDE 2000 THROUGH 2002
FATAL TRAFFIC ACCIDENT ACTIVITY

	2000	2001	2002	TOTAL
FATAL ACCIDENTS	37,409	37,795	38,309	113,513
FATAL ACCIDENTS INVOLVING VEHICLE DEFECTS UNDER STUDY	785	688	602	2,075
FATAL ACCIDENT VEHICLE DEFECT RATE	2.1	1.8	1.6	1.8
FATALITIES	41,821	42,116	42,815	126,752
FATALITIES IN ACCIDENTS INVOLVING VEHICLE DEFECTS UNDER STUDY	929	840	714	2,483

Discussion of Findings: From 2000-2002, a total of 113,513 traffic crashes occurred in this nation resulting in 126,752 persons being killed. Of the total fatal traffic crashes, 2,075, or 1.8%, involved one or more automobiles, sport utility vehicles, motorcycles, vans, and light trucks which had a vehicle defect that contributed to the cause of the crash. A total of 2,483 persons were killed in the 2,075 fatal traffic crashes involving vehicle defects as a causative factor.

It should be recognized that the actual number of fatal traffic crashes involving vehicle defects as a contributing factor is probably higher than indicated in Table 1. Refer to the "Methodology and Limitations" section of this report for an explanation of why vehicle defects may be under-reported as causal factors in traffic crashes (see sub-paragraph 2, page 3).

A total of 153,850 automobiles, sport utility vehicles, motorcycles, vans, and light trucks were involved in the 113,513 nationwide fatal traffic crashes during this three-year period. Table 2 identifies the vehicle defect causation rates / ratios of these vehicles based on registration states which have periodic motor vehicle safety inspection programs and those that do not. In addition, vehicle defect causation rates / ratios are displayed related to vehicles registered in the State of Missouri.

TABLE 2

AUTOMOBILES, MOTORCYCLES, VANS, LIGHT TRUCKS, AND SPORT UTILITY VEHICLES INVOLVED IN 2000 - 2002 NATIONWIDE FATAL CRASHES VEHICLE DEFECT RATES / RATIOS BY REGISTRATION STATE

VEHICLES REGISTERED IN:	TOTAL VEHICLES	VEHICLES HAVING DEFECT	RATE	RATIO
STATES REQUIRING PERIODIC SAFETY INSPECTION	52,566	636	1.2	1: 82.7
STATES REQUIRING RANDOM, SPOT, OR NO INSPECTION	95,396	1,308	1.4	1: 72.9
OTHER[1]	5,888	153	2.6	1: 38.5
TOTAL	153,850	2,097	1.4	1: 73.4
MISSOURI	3,529	30	0.9	1:117.6

[1]Includes vehicles not registered, registered in more than one state, U. S. government vehicles, vehicles registered in foreign countries, and vehicles whose registration status is not known.

<u>Discussion of Findings</u>: *For every 73.4 automobiles, sport utility vehicles, motorcycles, vans, and light trucks involved in 2000-2002 nationwide fatal traffic crashes, one had a vehicle defect causation factor. Vehicles registered in states having motor vehicle safety inspection programs had proportionately fewer defects as a causative factor than vehicles in states not having such programs. One of every 82.7 vehicles registered in states having periodic safety inspection programs had a vehicle defect compared to one in every 72.9 vehicles registered in states not having this type of program.*

Vehicles registered in the State of Missouri not only had proportionately fewer vehicle defects than all vehicles involved in fatal crashes, they had proportionately less vehicle defects than those registered in other states having periodic motor vehicle inspection programs. Only one vehicle in every 117.6 registered in the State of Missouri had a vehicle defect as a fatal traffic crash causative factor. (See Appendix B for graphical presentation).

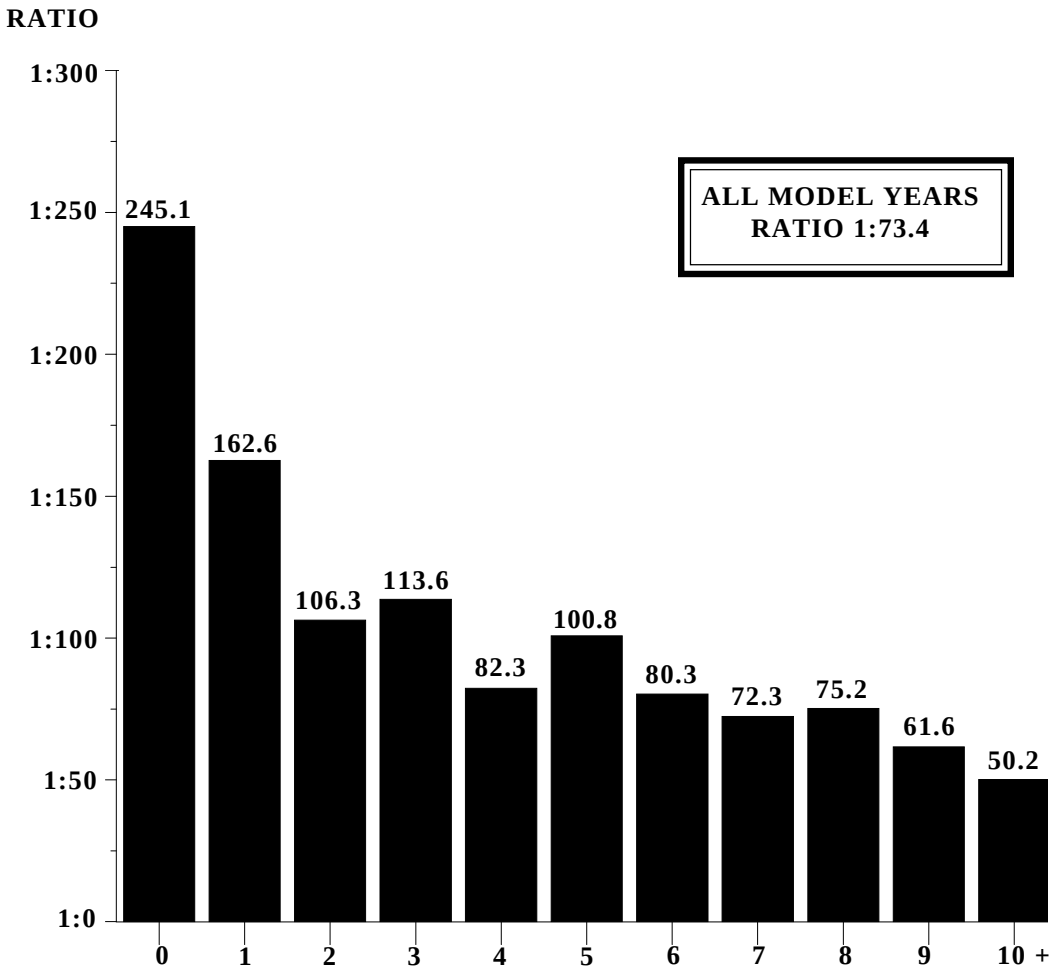
Another analysis was completed to determine if the age of the vehicle had an impact on its defect causation rates / ratio. Age was determined by examining the model year of the vehicle in relation to the year of the fatal traffic crash. Table 3 displays the results of this analysis.

TABLE 3

AUTOMOBILES, MOTORCYCLES, VANS, LIGHT TRUCKS, AND SPORT UTILITY VEHICLES INVOLVED IN 2000 - 2002 NATIONAL FATAL CRASHES VEHICLE DEFECT RATES / RATIOS BY VEHICLE AGE

MODEL YEAR OF VEHICLE COMPARED TO CRASH YEAR:	TOTAL VEHICLES	VEHICLES HAVING DEFECT	RATE	RATIO
SAME YEAR OR GREATER	10,293	42	0.4	1:245.1
-1 YEAR	11,380	70	0.6	1:162.6
-2 YEARS	10,738	101	0.9	1:106.3
-3 YEARS	10,566	93	0.9	1:113.6
-4 YEARS	10,118	123	1.2	1: 82.3
-5 YEARS	10,285	102	1.0	1:100.8
-6 YEARS	9,960	124	1.2	1: 80.3
-7 YEARS	9,839	136	1.4	1: 72.3
-8 YEARS	9,095	121	1.3	1: 75.2
-9 YEARS	8,378	136	1.7	1: 61.6
-10YEARS OR GREATER	52,337	1,042	2.1	1: 50.2
UNKNOWN	874	7	0.8	1:124.9
TOTAL	153,863	2,097	1.4	1: 73.4

AUTOMOBILES, MOTORCYCLES, VANS, LIGHT TRUCKS, AND SPORT UTILITY VEHICLES INVOLVED IN 2000 - 2002 NATIONAL FATAL CRASHES VEHICLE DEFECT RATES / RATIOS BY VEHICLE AGE



***Unknown is excluded**

FIGURE 3

Discussion of Findings: It is readily apparent that newer vehicles have proportionately fewer vehicle defect causation factors than older vehicles involved in fatal traffic crashes. For every 73.4 automobiles, sport utility vehicles, motorcycles, vans, and light trucks involved in 2000-2002 fatal traffic crashes, one had a vehicle defect that contributed to the cause of the incident. If the vehicle's model year was the same or greater than the year of the crash, the ratio was 1 to 245.1. If it was one year less than the crash year, it was 1 to 162.6. If it was two years less than the crash year, it was 1 to 106.3. Vehicle defects as a causation factor continue to increase in relation to the age of the vehicle.

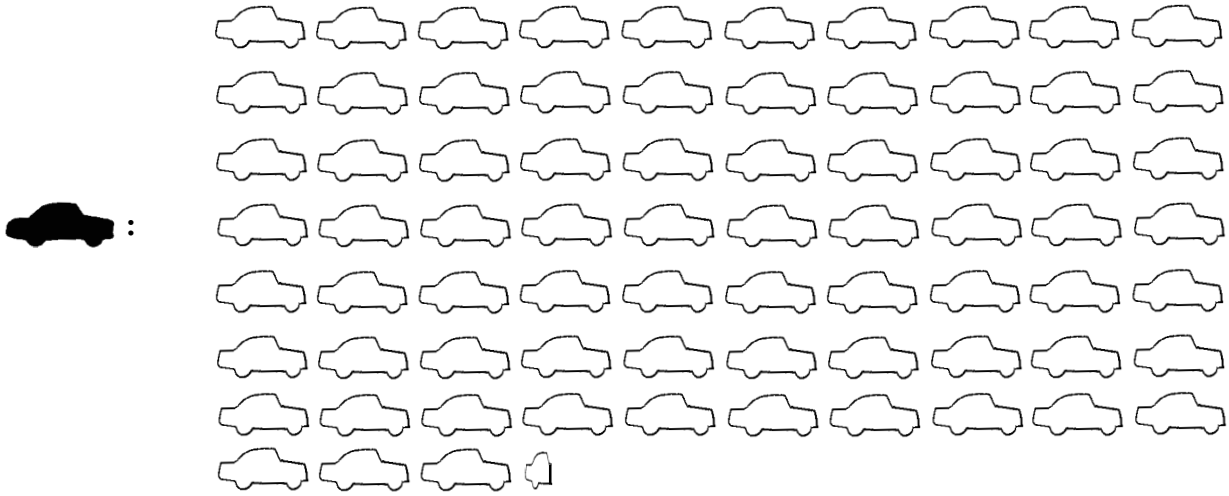
APPENDIX A

APPENDIX B

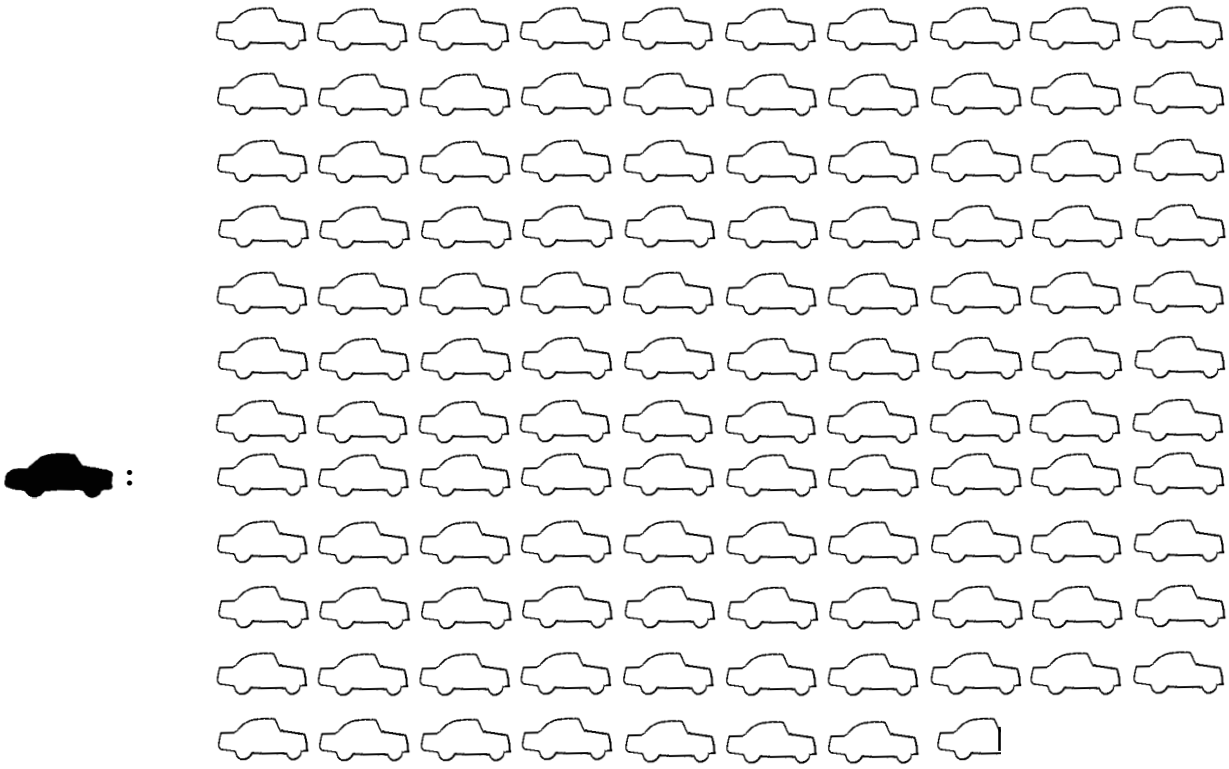
MOTOR VEHICLE INSPECTION STUDY

AUTOMOBILES, MOTORCYCLES, VANS, LIGHT TRUCKS, AND SPORT UTILITY VEHICLES INVOLVED IN 2000 - 2002 FATAL TRAFFIC CRASHES VEHICLE DEFECT CAUSATION RATIO

NATIONWIDE: FOR EVERY 73.4 VEHICLES INVOLVED IN 2000-2002 FATAL TRAFFIC CRASHES, 1 HAD A VEHICLE DEFECT CAUSATION FACTOR.



MISSOURI: FOR EVERY 117.6 VEHICLES INVOLVED IN 2000-2002 FATAL TRAFFIC CRASHES, 1 HAD A VEHICLE DEFECT CAUSATION FACTOR.



MISSOURI STATE HIGHWAY PATROL

NATIONWIDE AND MISSOURI
MOTOR VEHICLE SAFETY INSPECTION PROGRAM
FATAL CRASH ANALYSIS
2000 - 2002

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